

Claims

1 1. OFDM telecommunication device (1) comprising an analog RF and/or IF stage and a digital stage to generate and/or process the baseband signal, **characterized by** a transformation unit (2) that incorporates at least an analog multiplication step and an at least analog convolution step of a multiplication convolution multiplication algorithm or a convolution multiplication convolution algorithm to perform a fourier transformation for demodulation and/or an inverse fourier transformation for modulation into the analog stage.

10 2. OFDM telecommunication device according to claim 1, **characterized by** an IQ processing unit that incorporates a multiplication step of said multiplication convolution multiplication algorithm.

15 3. OFDM telecommunication device (1) according to claim 1 ~~or 2~~, **characterized in that** said transformation unit (2) comprises
an analog multiplier (6; 22) to perform a frequency conversation of a signal input thereto by the multiplication of said input signal with a chirp signal, and
an analog delay means having different delay properties to perform said convolution.

20 4. OFDM telecommunication device (1) according to ^{CLAIM 1} ~~anyone of the preceding claims~~, **characterized in that** said transformation unit (2) comprises a surface acoustic wave device or a CCD to perform said convolution.

a 25 5. OFDM telecommunication device according to ^{CLAIM 1} ~~anyone of the preceding claims~~, **characterized in that** it is a part of a high data rate system.

a 6. OFDM telecommunication device (1) according to ^{CLAIM 1} ~~anyone of the preceding claims~~, **characterized in that** said transformation unit (2) is placed in the
30 lowest IF stage.

a 7. OFDM telecommunication device (1) according to ^{CLAIM 1} ~~anyone of the preceding claims~~, **characterized in that** said transformation unit (2) performs a RF to IF down-conversion and/or an IF to RF up-conversion.

0 1 8. OFDM telecommunication device (1) according to ^{CLAIM 1} ~~anyone of the preceding~~
~~ing claims~~, **characterized in that** it is a receiver of OFDM modulated signals
and the transformation unit (2a) comprises

an analog first multiplier (6) that multiplies the received OFDM RF-sig-
5 nal with a chirp signal, and

an analog delay means (7) with different delay properties receiving and
convoluting the IF output signal of said analog first multiplier (6).

9. OFDM telecommunication device (1) according to claim 8, **characterized**
10 **by** a second multiplier (8) to multiply the convoluted IF-signal with said chirp
signal that is not phase shifted to output a real baseband signal, and a third
multiplier (9) to multiply the convoluted IF-signal with said chirp signal that is
phase shifted by 90 degrees to output an imaginary baseband signal.

15 10. OFDM telecommunication device (1) according to claim 8, **characterized**
by a digital processing unit (19) receiving the convoluted IF-signal via an ana-
log to digital converter (17) to output a real baseband signal and an imaginary
baseband signal.

20 11. OFDM telecommunication device (1) according to claim 8, **characterized**
by a CORDIC calculation unit (20) receiving the convoluted IF-signal via an
analog to digital converter (17) and an IQ demodulator (21) to output a real
baseband signal and an imaginary baseband signal.

25 12. OFDM telecommunication device (1) according to ^{CLAIM 8} ~~anyone of claims 8 to~~
~~11~~, **characterized in that** said analog transformation unit (2) performs time
and frequency synchronization of the OFDM telecommunication device (1) on
basis of at least one received control signal by performing a controlled genera-
tion of said chirp signal for the analog first multiplier (6).

30 13. OFDM telecommunication device (1) according to ^{CLAIM 1} ~~anyone of the preced-~~
~~ing claims 1 to 7~~, **characterized in that** it is a transmitter of OFDM modu-
lated signals and the transformation unit (2b) comprises

an analog delay means (7) with different delay properties receiving and
35 convoluting an IF signal that results from the baseband signal that is to be
transmitted,

and an analog fourth multiplier (22) that multiplies the convoluted IF-

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1 signal output by the analog delay means (7) with a chirp signal to output a
OFDM signal.

14. OFDM telecommunication device (1) according to claim 13, **character-**
5 **ized by** a fifth multiplier (23) to multiply the real part of a baseband signal
with said chirp signal that is not phase shifted, a sixth multiplier (24) to mul-
tiply the imaginary part of the baseband signal with said chirp signal that is
phase shifted by 90 degrees and an adder (25) receiving the output signals of
the fifth and sixth multipliers (23, 24) to add them and to output said IF signal
10 to said transformation unit (2b).

15. OFDM telecommunication device (1) according to claim 13, **character-**
15 **ized by** a digital processing unit (34) receiving the real part of the baseband
signal and the imaginary part of the baseband signal to output said IF signal
via a digital to analog converter (30) to said transformation unit (2b).

16. OFDM telecommunication device (1) according to claim 13, **character-**
20 **ized by** a CORDIC calculation unit receiving the real part of the baseband sig-
nal and the imaginary part of the baseband signal to output said IF signal via
an IQ modulator and a digital to analog converter to said transformation unit
(2b).

17. OFDM telecommunication device (1) according to ^{CLAIM 8} ~~anyone of claims 8 to~~
25 ~~15, characterized in that~~ said analog delay means (7) comprises an analog
chirp filter.

18. OFDM telecommunication device (1) according to anyone of the preced-
ing claims, **characterized in that** it is a transceiver for OFDM modulated sig-
nals and the analog transformation unit (2) comprises features as defined in
30 anyone of claims 7 to 11 and 16 for the receiver side in combination with the
features as defined in anyone of claims 12 to 15 and 16 for the transmitter
side.

19. OFDM telecommunication device (1) according to ^{CLAIM 8} ~~anyone of claims 8 to~~
35 ~~18, characterized in that~~ said chirp signal is analog produced as impulse re-
sponse of a chirp filter included in an analog chirp generator (10a, 10b).

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a 1 **20.** OFDM telecommunication device (1) according to ^{CLAIM 8}~~anyone of claims 8 to 18~~, **characterized in that** said chirp signal is digitally produced by a digital chirp generator (10c).

5 **21.** OFDM telecommunication device (1) according to ^{CLAIM 1}~~anyone of the preceding claims~~, **characterized in that** it is used in a BRAN system.

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